TS-2050zx MODIFICATION KIT
<u>DOCUMENTATION</u>

OBJECTIVE...

This **HARDWARE/SOFTWARE MODIFICATION KIT** will allow the user to operate the **WESTRIDGE TS 2050 Modem** with the **SINCLAIR ZX Interface 1 and Microdrives.**

WHY IT DID NOT WORK...

The reason that the **TS-2050 WILL NOT work "as-is"** is because of an ADDRESS CONFLICT between the Interface-1 and the TS-2050.
That is the BASIC reason at least but gets slightly more involved when selecting a new PORT ADDRESS to operate the Modem from.
For a close-up discussion as to how to avoid this problem you should consult a copy of **"THE SPECTRUM HARDWARE MANUAL"** by Adrian Dickens Published by MELBOURNE HOUSE. If you have access to a copy, read the section in Chapter 14 called "ADDING 128 I/O PORTS". For those of you who are un-able to obtain a copy I will quote a few words from that section....

"In the Spectrum a very simple form of decoding I/O port addresses is used. A0 is used to select the ULA, A1 the ZX printer and A3, A4, A5 the microdrives and RS-232 interface. No more than one of these address lines should ever be at logic 0 during an I/O operation. If they are then several devices will try to use the data bus simultaneously. Homebrew circuits therefore only have address lines A5, A6 and A7 available to select them."

The "stock" TS-2050 Modem uses PORT $73 (HEX) or 115 (DEC) for DATA I/O and PORT $77 (HEX) or 119 (DEC) for CONTORL and STATUS I/O.

Convert these numbers to BINARY and you can see where the "rub" is:

	ADDRESS LINES							
	A7	A6	A5	A4	A3	A2	A1	A0
PORT $73 (HEX) =	0	1	1	1	0	1	1	1
PORT $77 (HEX) =	0	1	1	1	0	0	1	1
					*	*		

* = Conflict on <u>BOTH</u> addresses!

NOW THE "PATCH"...

Now that we understand what the problem is AND we have an idea of what address lines we CAN NOT use, (A0 thru A4), we now know the "range" of addresses we CAN employ.

After you install this modification to your TS-2050 it will allow you to change the port addresses that the modem uses to those that are a lot more "agreeable" to the ZX Interface-1 and here is what the "new" port addresses will be:

DATA PORT = $3F (HEX) or 63 (DEC)
CONTROL/STATUS PORT = $7F (HEX) or 127 (DEC)

And in BINARY...

	ADDRESS LINES							
	A7	A6	A5	A4	A3	A2	A1	A0
PORT $3F (HEX) =	0	0	1	1	1	1	1	1
PORT $7F (HEX) =	0	1	1	1	1	1	1	1

BINGO!! Easy stuff 'eh?

Well, like they say, "....looks good on paper."

Now off to the tool crib. Here's what we will need:

1> A Phillips screwdriver (To take the modem case apart.)
2> A 25 to 30 Watt Pencil soldering iron.
3> A pair of needle-nose pliers and diagonal cutters.
4> An X-ACTO knife with a nice sharp blade.
5> A drill with a bit that is of a suitable size to mount the toggle switch, (if you wish to do so).
6> Some solder (a QUALITY 60/40 rosin core type), a small wire brush or flux remover (rubbing alcohol is great too) and DON'T FORGET EYE PROTECTION!!

And the parts department...

A> 1 Three Pole Double Throw switch. (Radio Shack #275-6661 or an equivalent)

B> 7 pices of small-gauge "hook-up" wire Approx. 6" long is fine and you should obtain 7 different colors.

The best stuff to use is a length of "rainbow" ribbon cable and separate the conductors into individual wires. The SCHEMATIC is marked with the "first 7" colors that you will normally find. They are: BROWN, RED, ORANGE, YELLOW, GREEN, BLUE and VIOLET. (If you decide on a different scheme you are on your own. BE CAREFULL!! If you make a mistake it could cost you a computer or modem or both!)

READY FOR ASSEMBLY...

Now we are ready to open the modem, carefully remove the case and place the P.C. card on the work bench "solder-side" up.

Prepare the toggle switch as shown in DRAWING "A".

After the switch is complete, study DRAWING "B" & "C" also the schematic to determine what P.C. "lands" (conductors) are to be cut and where to solder the wires from the switch.
When soldering, apply just enough heat (and solder) to do the job.
Also when cutting the P.C. lands note that you do cut a little "chunk" out. Don't rely on a "scratch" of the X-ACTO blade to do the job.

Now you can select a position on the rear or front panel to mount your toggle switch. Be sure that it won't get in the way of the P.C. card or a component on the card when you re-assemble the modem.

CHECK and RE-CHECK YOUR ASSEMBLY!!! If it all looks good, let's go for a SMOKE-TEST!!! (...sorry.)

Also, can you remember which position the switch is in for "NORMAL MODE" and which is the "2050zx MODE"?

First let's try MTERM-II in "NORMAL MODE" and see if we are "functional". (Don't connect the Interface-1 it won't work.)

If everything is "nominal" then we are all set to try the "2050zx MODE"!

Before we do, we must customize a copy of MTERM-II with some simple software "POKES" so it will communicate with the TS-2050 in "2050zx" mode.

Refer to the "MTERM-II TERMINAL SOFTWARE MODIFICATION GUIDE" and follow the instructions.

MTERM-II - TERMINAL SOFTWARE MODIFICATION GUIDE

Instructions for patching MTERM-II for use with the Sinclair ZX Interface-1 and Microdrives and the WESTRIDGE TS-2050 Modem with the "2050zx MODIFICATION KIT" installed.

1> Set-up your TS-2068 for SPECTRUM MODE and switch it on.

2> Execute: CLEAR 53950 and press <ENTER>.

3> Execute: LOAD "mterm"CODE and press <ENTER>.
NOTE: If you have a BASIC LOADer that auto-runs MTERM or contains an "AUTO-DIALER" remember to change the IN/OUT addresses to the "new" ones. ALSO if you are running a printer driver that is "PORT DEPENDANT" for Data I/O to the TS-2050 they too have to be changed. Because of the diverse configurations that are available, you are on your own in this department. (sorry)

4> Execute the following "POKES".

I/O Port Addresses and their NEW values.

HEX	DEC VAL	HEX	DEC VAL
E712 =	59154,127	E719 =	59161,63
E724 =	59172,127	E735 =	59189,63
E73C =	59196,127	E73E =	59198,127
E740 =	59200,127	E744 =	59204,127
E74A =	59210,127	E752 =	59218,127
D6A6 =	54950,127	D69A =	54938,127
D67F =	54911,127	D5E1 =	54753,127

THIS ENDS THE POKES FOR THE I/O ADDRESSES

The following two "POKES" will allow you to "EXIT to BASIC" while in SPECTRUM MODE and NOT "CRASH".

```
POKE 54554,207
POKE 54555,255
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Now let's save your "Spectrum Friendly" version of MTERM-II to tape.

Execute: SAVE "mtermzx"CODE 54016,7721 and press <ENTER>.

(On Microdrive)
Execute: SAVE*"m";1;"mtermzx"CODE 54016,7721 and press <ENTER>.

THAT'S IT.... Now you can customize MTERM to your taste. The I/O PORTS are as follows:

DATA = 63 (DEC)   CONTROL/STATUS = 127 (DEC)

PROJECT SYNOPSIS.....

MTERM-II will function just as it did when running on the "standard" TS-2068 except when you "EXIT to BASIC" MTERM's main menu will still be present. To clear the screen just hit the <ENTER> key and you will have a clear screen with the "K" cursor ready for your commands. Also, with the Interface-1 attached the "extended" BASIC commands and error codes are "on-line" as well. For example, with the Interface-1 attached and you do the "normal" PRINT USR 54016 to enter MTERM and then EXIT to BASIC again you will see the " Program finished, 0:1 " message at the bottom of the screen. And the BUFFER COUNTER will display a slightly different value with the Interface-1 attached as without (30153 with the Interface-1 attached). Note too that I have no idea what might happen if you were to fill-up the buffer while in SPECTRUM mode. I would guess you could "over-write" the extended basic and "lock" or "crash". And that brings us to give credit where it's due.

I must take the "praise" and "heat" for the hardware dependant hacks to the modem and MTERM-II I/O port POKES (the easy part). But MTERM-II would NOT have worked without the two added POKES at 54554 and 54555 for they are the guys that allow you to exit to basic. I have "known" and have used them since JUNE of 1985. They "appeared" one day in a message on my BBS and as far as I know originated in an article in the TIMELINEZ News letter published in the San Francisco Bay area. Thus I have no idea as to who the original author was but the many ZX Microdrive users stress their gratitude. One last word on clearing the buffer...Only use the "ERASE DATA BUFFER" command from the menu in MTERM. If you clear the BASIC area with NEW you will not be able to exit back to BASIC after you enter MTERM. I think "NEW" resets the two POKES at 54554 and 54555.

The PORT addresses that I selected for this project are (to the best of my knowlege) not used by any of the "standard" peripherals associated with the SPECTRUM computer. If you have a device that shares one of the addresses then you may have a problem. You can change the addresses on the 2050 to just about anything you want. Just remember the "binary decoding" structure that the SPECTRUM uses for it's self and you should have no problems selecting a second address scheme. I have operated this system for more than a month before release to the general public and have found no "bugs" other than those mentioned above.

Happy MODEMing,

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Visit the TIME-=<X>=-CHANGE RBBS-RCP/M 300/1200 Baud 24Hrs.
(213) 329-3922

SCHEMATIC
TIMEX / SINCLAIR
(T/S 2050 MODEM)

ADDRESS PORTS:
$73 = DATA
$77 = CONTROL/STATUS

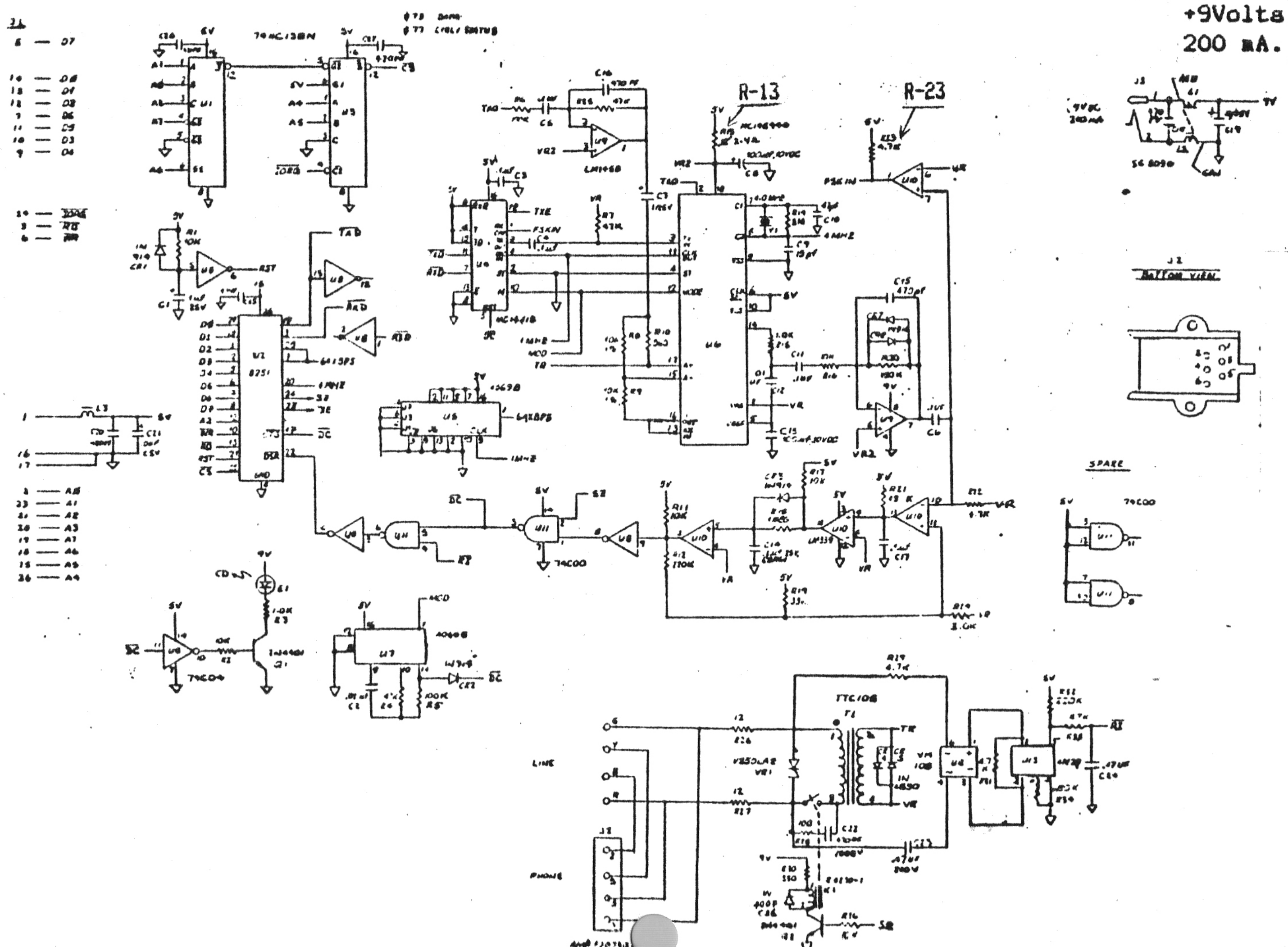
J-1 PIN-CALLS:

5 - D7
14 - D0
13 - D1
12 - D2
7 - D6
11 - D5
10 - D3
9 - D4

24 - $\overline{IORQ}$
3 - $\overline{RD}$
6 - $\overline{WR}$
1 - +5Volts
16 - -5Volts/GND
17 - -5Volts/GND

2 - A0
23 - A1
21 - A2
20 - A3
19 - A7
18 - A6
25 - A5
26 - A4

Please see attached documentation...



J-2 PIN-CALLS:

PIN	COLOR	FUNCT
2	YEL	PASS
3	GRN	TIP
4	RED	RING
5	BLK	PASS

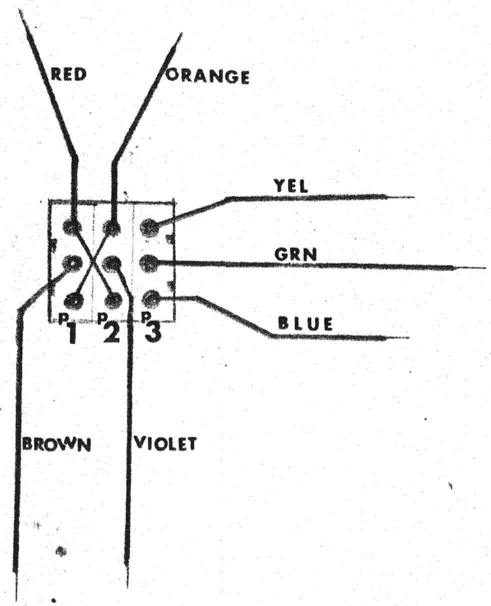
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Drawing 'A'

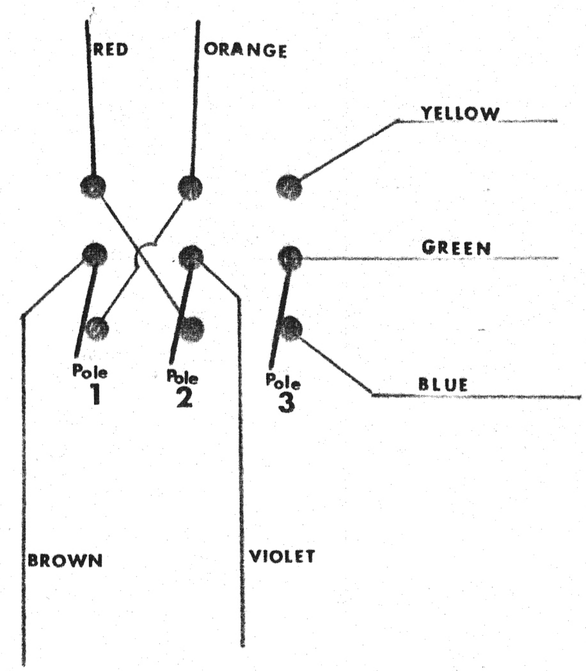
NAME: SWITCH ASSEMBLY

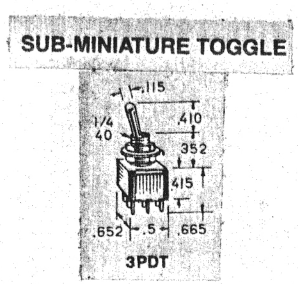
S-1

DEPT



Bottom View

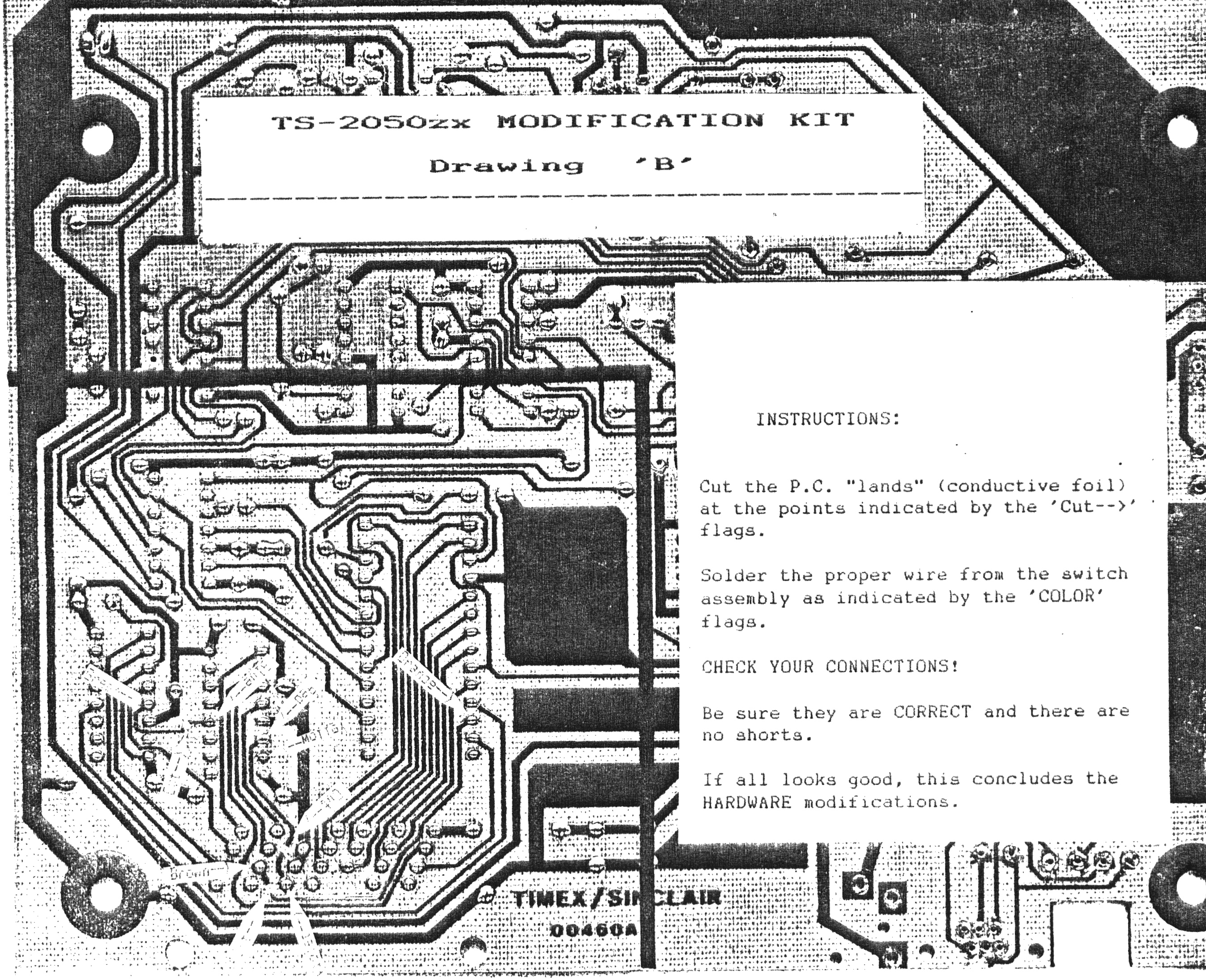




Form 18-110A (R11-83)

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Drawing 'B'



INSTRUCTIONS:

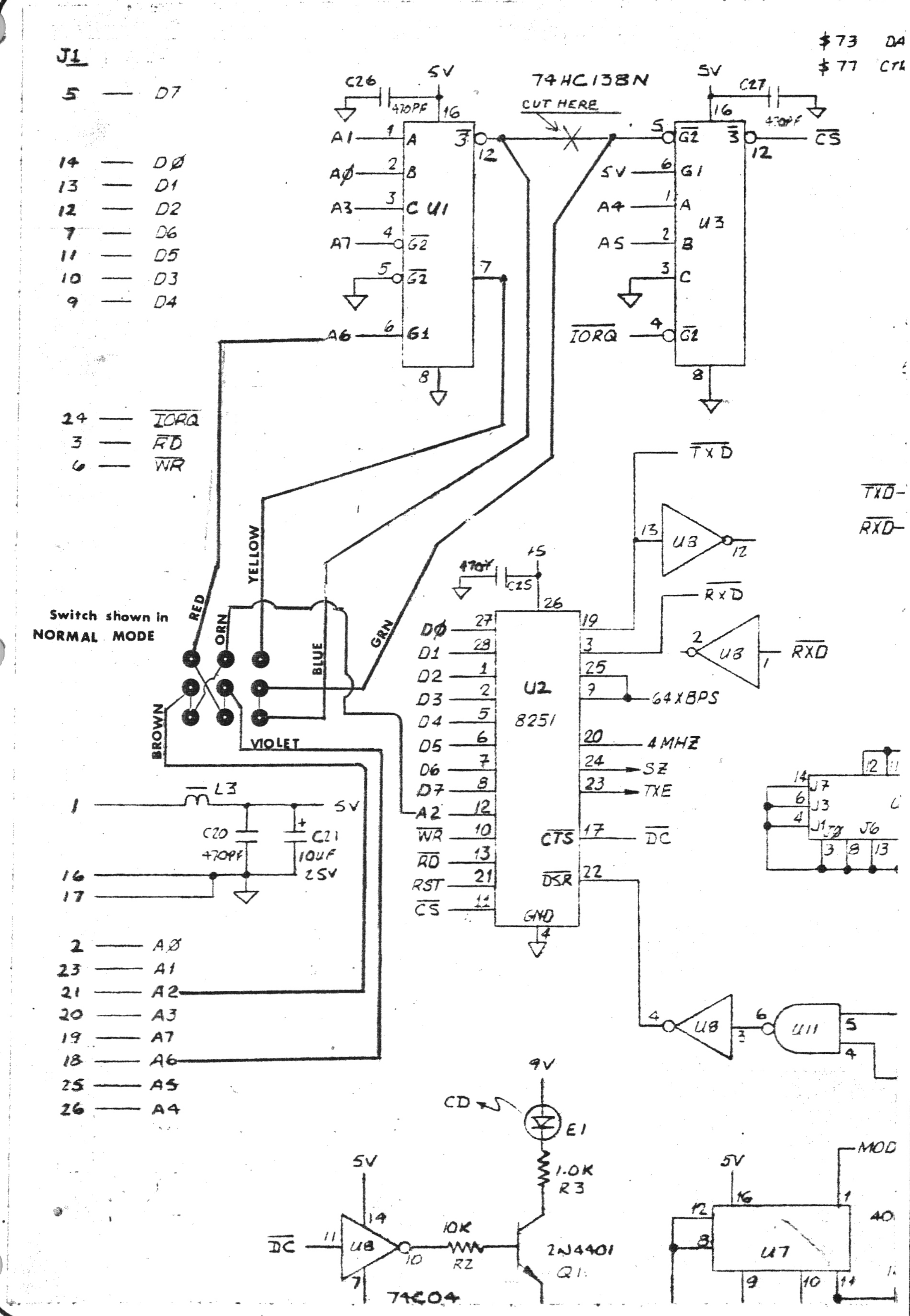
Cut the P.C. "lands" (conductive foil) at the points indicated by the 'Cut-->' flags.

Solder the proper wire from the switch assembly as indicated by the 'COLOR' flags.

CHECK YOUR CONNECTIONS!

Be sure they are CORRECT and there are no shorts.

If all looks good, this concludes the HARDWARE modifications.



TS-2050ZX MOD KIT

Drawing 'C'

LAYOUT S-1

TS-2050zx MODIFICATION KIT
Component Location "MAP"
Drawing 'D'

